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West Coast Projects Office  
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2462-00209

**LOCKHEED MARTIN**



Via Federal Express  
CAY0999/344 WBS #48

September 20, 1999

Mr. Gerard J. Thibeault  
Executive Officer  
California Regional Water Quality Control Board  
Santa Ana Region  
3737 Main Street, Suite 500  
Riverside, California 92501-3339

Dear Mr. Thibeault:

**Subject: July 1999 Data Report  
Water Supply Contingency Plan  
Production Well Sampling Program  
Crafton-Redlands Plume Project**

In compliance with the approved Water Supply Contingency Plan, enclosed please find one copy of the **July 1999, Production Well Sampling Program** report prepared by HSI-Geotrans for the Lockheed Martin Corporation. This report presents analytical results from samples collected at Bunker Hill Basin Production Wells in July of 1999. Laboratory Quality Assurance/Quality Control documentation is in Attachment B which is also enclosed for your review.

Should you have any questions, comments, or request, please contact Tom Blackman at (818) 847-0791 or John Hemmans at (818) 847-0191.

Sincerely,

for  
Carol A. Yuge

Enclosures

CAY:JH:mg

cc: See Attached Distribution List

Gerard Thibeault  
September 20, 1999  
CAY0999/344  
Page 2

**Distribution:**

cc: (Abbreviated Report Without Attachments "A & B" Which are Available Upon Request)  
Kim Alexander, Psomas  
Kalyanpur Baliga, Department of Health Services (San Bernardino)  
Tom Bartol, USAF, Norton Air Force Base  
Henry Dennis, Mountainview Power Company  
Dodie Farmer, Victoria Farms Mutual Water Company  
Douglas Headrick, San Bernardino Valley Water Conservation District  
Mike Huffstutler, City of Redlands  
Ross Lewis, Gage Canal Company  
Kevin Mayer, US EPA (Region IX)  
Steve Mains, Western Municipal Water District  
Morris Matson, Loma Linda University  
Eugene McMeans, Riverside Highland Water Company  
Zahra Panahi, City of Riverside  
Dan Randall, City of Riverside  
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Toby Roy, Department of Health Services (San Diego)  
Alain Sharp, Earth Technology Corporation  
Greg Snyder, City of Loma Linda  
Joseph Stejskal, City of San Bernardino  
Dieter Wirtzfeld, City of Riverside



# HSI GEOTRANS

A TETRA TECH COMPANY

3150 Bristol Street  
Suite 500  
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714-513-1415 FAX 714-513-1278

September 24, 1999

Lockheed Martin Corporation  
West Coast Project Office  
2550 N. Hollywood Way, 3<sup>rd</sup> Floor  
Burbank, California 91505

Attention: Mr. John Hemmans  
Project Coordinator

Subject: July 1999 Data Report  
Water Supply Contingency Plan  
Production Well Sampling Program  
Crafton-Redlands Plume Project

Dear Mr. Hemmans:

This report presents a summary of results of the Water Supply Contingency Plan production well sampling for the month of July 1999. The Water Supply Contingency Plan (WSCP) was prepared by Lockheed Martin Corporation and submitted to the State of California Regional Water Quality Control Board (RWQCB) Santa Ana Region on September 30, 1996. The plan was conditionally approved by the RWQCB in a letter dated March 6, 1997. The WSCP for the Crafton-Redlands Plume was prepared to address maintenance of water supply to purveyors in the event that wells became impacted with trichloroethene (TCE) from the Crafton-Redlands TCE Plume. A summary of key dates and WSCP sampling program evolution is provided on Table 1.

The locations of the WSCP wells and analytical results for the July 1999 sampling event for TCE and perchlorate are shown on Figures 1 and 2, respectively. Table 2 presents a summary of analytical tests performed on each WSCP well and water system sampling point. The sampling frequency of each well is once a month for the first year. More frequent sampling, if required, is based on the analytical results as outlined in the WSCP TCE and perchlorate decision matrices, provided as Figures 3 and 4, respectively. The perchlorate decision matrix was presented in the *Perchlorate Work Plan and Schedule*, which was submitted, to the RWQCB on August 15, 1997. The RWQCB approved the Perchlorate Work Plan on October

31, 1997. Table 3 presents a summary of the wells sampled twice monthly according to the decision matrices.

## **RESULTS**

A summary of the analytical results for the July 1999 WSCP sampling event for TCE and perchlorate is shown on Figures 1 and 2, respectively, and presented on Table 4. Available groundwater elevation data is provided on Table 5. The water sampling field forms are provided in Attachment A. The chain-of-custody, laboratory data sheets, and Level 1 Modified laboratory quality assurance/quality control (QA/QC) documentation is provided in Attachment B.

### ***Trichloroethene***

Four groundwater samples collected in July met or exceeded 2/5<sup>th</sup> the MCL for TCE (2.0 µg/L) including; Gage 26-1 (10 µg/L), Gage 27-1 (6.9 µg/L), Gage 29-2 (4.9 µg/L), and Gage 29-3 (7.3 µg/L). Gage 26-1 and Gage 27-1 were placed into TCE treatment in May 1999; therefore, they will be sampled once a month. The TCE impacts at Gage 29-2 and Gage 29-3 are partially attributed to the Norton AFB plume, thus more frequent sampling will not be implemented.

### ***Perchlorate***


In the July WSCP sampling, perchlorate was detected at or above 75 percent (13.5 µg/L) of the PAL in one City of Loma Linda system sampling point (Mountain View Blend-Lawton), and three City of Riverside wells (Gage 29-2, Gage 29-3, and Gage 51-1). Gage 29-2, Gage 29-3, and Gage 51-1 are currently being sampled on a twice a month basis.

The July 6, 1999 sample from Mountain View Blend-Lawton system sampling point had a perchlorate concentration that exceeded 75 percent of the PAL. In accordance to the perchlorate decision matrix (Figure 3), a confirmation sample was collected from Mountain View Blend-Lawton system sampling point on July 22, 1999. The confirmation sampling results did not exceed 75 percent of the perchlorate PAL, thus, twice monthly sampling of the Mountain View-Lawton system sampling point will not be implemented.

**CLOSING**

HSI GeoTrans greatly appreciates being of continued service to Lockheed Martin Corporation on this project. Should you have any questions or comments, please do not hesitate to call.

Sincerely,  
**HSI GEOTRANS**



Roy J. Marroquin  
Project Manager



James C. Norman, R.G., C.HG.  
Project Director

## TABLES

**TABLE 1**

**KEY PROJECT DATES AND WSCP SAMPLING PROGRAM EVOLUTION**

August 2, 1996, the RWQCB – Santa Ana Region requested Lockheed Martin to submit a conceptual Water Supply Contingency Plan.
September 30, 1996, Lockheed Martin submitted the Water Supply Contingency Plan (WSCP) to the RWQCB – Santa Ana Region.
March 6, 1997, the RWQCB conditionally approved the WSCP, which included sampling eight production wells (City of Loma Linda Richardson #1, Richardson #2, Mountain View #1, Mountain View #2, Victoria Farms Mutual Water Company Wells #1 and #3, and Southern California Edison #1 and #2).
June 1997, Victoria Farms Mutual Water Company was connected to City of San Bernardino Water. Pumping ceased at VFMWC #1 and #3, and the two wells were removed from the program.
June 1997, sampling of SCE #1 was discontinued because it is not operated on a regular basis. The WSCP consists of five wells, including COLL Mountain View #1 and #2, COLL Richardson #1 and #2, and SCE #2 (AUX).
August 1997, the WSCP was expanded due to the detection of perchlorate in municipal supply wells in the Bunker Hill Basin. Twenty-six wells were added to the WSCP including nineteen City of Riverside wells, five City of Redlands wells, and two Loma Linda University wells, for a total of 31 wells.
October 1997, three City of Riverside water system sampling points were added to the WSCP, including the Gage system pipeline (Gage Delivery), the Waterman system pipeline (Iowa Booster), and the sampling station measuring outflow from the Linden and Evans Reservoirs (7 <sup>th</sup> & Chicago).
March 1998, two City of Loma Linda water system sampling points were added to the WSCP, including the Mountain View system pipeline (Mountain View Blend at Lawton) and the Richardson system pipeline (Richardson Blend).
June 1998, one City of Riverside irrigation water system sampling point (Gage Arlington) and one additional City of Loma Linda water system sampling point (Mountain View Blend at Timoteo) were added to the WSCP.
December 1998, the new COLL Richardson #3 well was added to WSCP Sampling Program.
May 1999, Sampling of Mountain View Blend at Timoteo was discontinued because it does not represent a blend sample of the Mountain View pipeline system.

TABLE 2

## WSCP PRODUCTION WELL SAMPLING PROGRAM

HSI#	Well Name	Perchlorate	TCE
<b>City of Loma Linda</b>			
692	Mountain View #2	X	X
693	Richardson #1	X	X
694	Richardson #2	X	X
707	Richardson #3	X	X
<b>City of Loma Linda Water System Sampling Points</b>			
2967	Mountain View Blend - Lawton	X	X
2968	Richardson Blend	X	X
<b>Southern California Edison</b>			
554	SCE#2(AUX)	X	X
<b>Loma Linda University</b>			
267	LLUniv Anderson #2	X	
717	LLUniv Anderson #3	X	
<b>City of Riverside (Gage System)</b>			
252	Gage#26-1	X	X
258	Gage#27-1	X	X
259	Gage#27-2	X	X
260	Gage#29-1	X	X
219	Gage#29-2	X	X
220	Gage#29-3	X	X
218	Gage#30-1	X	X
214	Gage#31-1	X	X
215	Gage#46-1	X	X
253	Gage#51-1	X	X
216	Gage#56-1	X	X
257	Gage#66-1	X	X
644	Gage#92-1	X	X
641	Gage#92-2	X	X
642	Gage#92-3	X	X
<b>City of Riverside (Waterman System)</b>			
273	Hunt#6	X	
271	Hunt#10	X	
272	Hunt#11	X	
<b>City of Riverside Water System Sampling Points</b>			
2946	Iowa Booster (Waterman)	X	X
2947	Gage Delivery (Gage)	X	X
2948	7th & Chicago (Reservoir)	X	X
3018	Gage Arlington	X	
<b>City of Redlands</b>			
542	COR Church St	X	
2673	COR#38	X	
535	COR Mentone Acres	X	
29	COR Orange st	X	
74	CORRees	X	X

**Notes:**

TCE = Trichloroethene

Perchlorate analyzed using DHS Method (EPA 300.0 Modified)

TCE analyzed using EPA Method 502.2



TABLE 3

**WSCP PRODUCTION WELL SAMPLING PROGRAM  
JULY 1999 WELLS SAMPLED TWICE MONTHLY**

HSI#	Well Name	Perchlorate	TCE
<b>City of Loma Linda</b>			
692	Mountain View #2	X	
693	Richardson #1	X	
<b>City of Riverside (Gage System)</b>			
219	Gage #29-2	X	
220	Gage #29-3	X	
253	Gage #51-1	X	

**Notes:**

TCE = Trichloroethene

Perchlorate analyzed using DHS Method (EPA 300.0 Modified).

TCE analyzed using EPA Method 502.2.

**TABLE 4**  
**WSCP PRODUCTION WELL SAMPLING PROGRAM**  
**JULY 1999 DATA RESULTS**

HSI#	Well Name	Sample Date	Perchlorate (µg/L) Del Mar	TCE (µg/L) Del Mar
<b>City of Loma Linda</b>				
692	Mountain View #2	7/6/99	12	0.62
692	Mountain View #2*	7/15/99	6.4	NA
693	Richardson #1	7/6/99	ND(4)	ND(0.5)
693	Richardson #1*	7/15/99	ND(4)	NA
694	Richardson #2	7/6/99	8.6	ND(0.5)
707	Richardson #3	7/6/99	ND(4)	ND(0.5)
<b>City of Loma Linda Water System Sampling Points</b>				
2967	Mountain View Blend-Lawton	7/6/99	14	0.54
2967	Mountain View Blend-Lawton**	7/22/99	6.1	NA
2968	Richardson Blend	7/6/99	ND(4)	ND(0.5)
<b>Mountain View Power (Formerly Southern California Edison)</b>				
554	SCE#2(AUX)	7/7/99	ND(4)	ND(0.5)
<b>Loma Linda University</b>				
267	LLUniv Anderson #2	7/7/99	6.6	NA
717	LLUniv Anderson #3	7/7/99	5.6	NA
<b>City of Riverside (Gage System)</b>				
252	Gage#26-1 <sup>a</sup>	7/6/99	9.5	10
258	Gage#27-1 <sup>a</sup>	7/6/99	7.2	6.9
259	Gage#27-2	7/7/99	8.4	1.4
260	Gage#29-1	7/7/99	8.9	0.53
219	Gage#29-2	7/7/99	26	4.9
219	Gage 29-2*	7/15/99	22	NA
220	Gage#29-3	7/7/99	43	7.3
220	MUN-747	7/7/99	45	7.2
220	Gage#29-3*	7/15/99	39	NA
218	Gage#30-1	7/6/99	ND(4)	ND(0.5)
214	Gage#31-1	7/6/99	4.2	ND(0.5)
215	Gage#46-1	7/6/99	4.9	ND(0.5)
253	Gage#51-1	7/6/99	14	ND(0.5)
253	Gage#51-1*	7/15/99	13	NA
253	MUN-748	7/15/99	13	NA
216	Gage#56-1	7/6/99	ND(4)	ND(0.5)
257	Gage#66-1	7/7/99	11	ND(0.5)
644	Gage#92-1	7/6/99	13	0.55
644	MUN-746	7/6/99	13	0.68
641	Gage#92-2	7/6/99	ND(4)	ND(0.5)
642	Gage#92-3	7/6/99	ND(4)	ND(0.5)
<b>City of Riverside (Waterman System)</b>				
273	Hunt#6	NS	NS	NA
271	Hunt#10	NS	NS	NA
272	Hunt#11	7/8/99	7.7	NA
<b>City of Riverside Water System Sampling Points</b>				
2946	Iowa Booster (Waterman)	7/7/99	ND(4)	ND(0.5)
2947	Gage Delivery (Gage)	7/7/99	8.3	0.83
2948	7th & Chicago (Reservoir)	7/7/99	5.7	ND(0.5)
3018	Gage Arlington	7/7/99	8.6	NA
<b>City of Redlands</b>				
542	COR Church St <sup>a</sup>	7/7/99	5.1	NA
2673	COR#38 <sup>a</sup>	7/7/99	ND(4)	NA
535	COR Mentone Acres <sup>a</sup>	7/7/99	ND(4)	NA
29	COR Orange St <sup>a</sup>	7/7/99	ND(4)	NA
74	COR Rees	7/7/99	ND(4)	ND(0.5)

**Notes:**

- \* = Twice-monthly sampling result
- \*\* = Confirmation sampling results
- \* = Well sampled on quarterly basis, if active
- ND(4) = Not detected at the specified limit
- MUN = Duplicate sample collected from the well listed directly above
- NA = Not Analyzed
- NS = Not Sampled

- TCE = Trichloroethene
- Perchlorate analyzed using DHS Method (EPA 300.0 Modified)
- TCE analyzed using EPA Method 502.2
- b = Gage 26-1 and Gage 27-1 are currently being treated for TCE

TABLE 5

**SUMMARY OF WATER LEVEL MEASUREMENTS  
JULY 1999 SAMPLING EVENT**

HSI#	Well Name	Measure Date	Depth to Water	Measuring Point Elevation	Groundwater Elevation	Comments
<b>CITY OF LOMA LINDA</b>						
692	Mountain View #2	07/06/99	204	1085	881	Pumping
693	Richardson #1	07/06/99	173	1077	904	Pumping
694	Richardson #2	07/06/99	178	1078	900	Pumping
707	Richardson #3	07/06/99	205	NA	880	Pumping
<b>Southern California Edison</b>						
554	SCE#2(AUX)	NM	NM	1100.00	NM	Pumping
<b>Loma Linda University</b>						
267	LLUniv Anderson #2	NM	NM	1075	NM	Pumping
717	LLUniv Anderson #3	NM	NM	1070	NM	Pumping
<b>City of Riverside (Gage System)</b>						
252	Gage#26-1	07/06/99	91.20	1045.33	954.13	Pumping
258	Gage#27-1	07/06/99	88.20	1044.64	956.44	Pumping
259	Gage#27-2	07/06/99	92.70	1044.64	951.94	Pumping
260	Gage#29-1	07/06/99	96.70	1044.43	947.73	Pumping
219	Gage#29-2	07/06/99	86.00	1046.31	960.31	Pumping
220	Gage#29-3	07/06/99	81.00	1048.75	967.75	Pumping
218	Gage#30-1	07/06/99	177.10	1054.17	877.07	Pumping
214	Gage#31-1	07/06/99	129.00	1054.64	925.64	Pumping
215	Gage#46-1	07/06/99	157.80	1065.50	907.70	Pumping
253	Gage#51-1	07/06/99	184.80	1044.64	859.84	Pumping
216	Gage#56-1	07/06/99	178.10	1065.50	887.40	Pumping
257	Gage#66-1	07/06/99	145.80	1044.85	899.05	Pumping
644	Gage#92-1	07/06/99	170.80	1047.78	876.98	Pumping
641	Gage#92-2	07/06/99	188.60	1053.38	864.78	Pumping
642	Gage#92-3	07/06/99	183.30	1058.78	875.48	Pumping
<b>City of Riverside (Waterman System)</b>						
273	Hunt#6	NM	NM	1015.5	NM	Pumping
271	Hunt#10	NM	NM	1017	NM	Pumping
272	Hunt#11	NM	NM	1015.7	NM	Pumping
<b>City of Redlands</b>						
542	COR Church St	Jul-99	173.0	1344.8	1171.8	Pumping
2673	COR#38	Jul-99	93.0	NA	NA	Pumping
535	COR Mentone Acres	Jul-99	180.0	1506.4	1326.4	Pumping
29	COR Orange st	Jul-99	135.0	1282	1147.0	Pumping
74	COR Rees	Jul-99	215.0	1490	1275.0	Pumping

**Notes:**

All measurements reported in feet below measuring point (ft-bmp)

Water level measurements for all City of Loma Linda, City of Riverside, and City of Redlands wells were obtained by purveyor personnel.

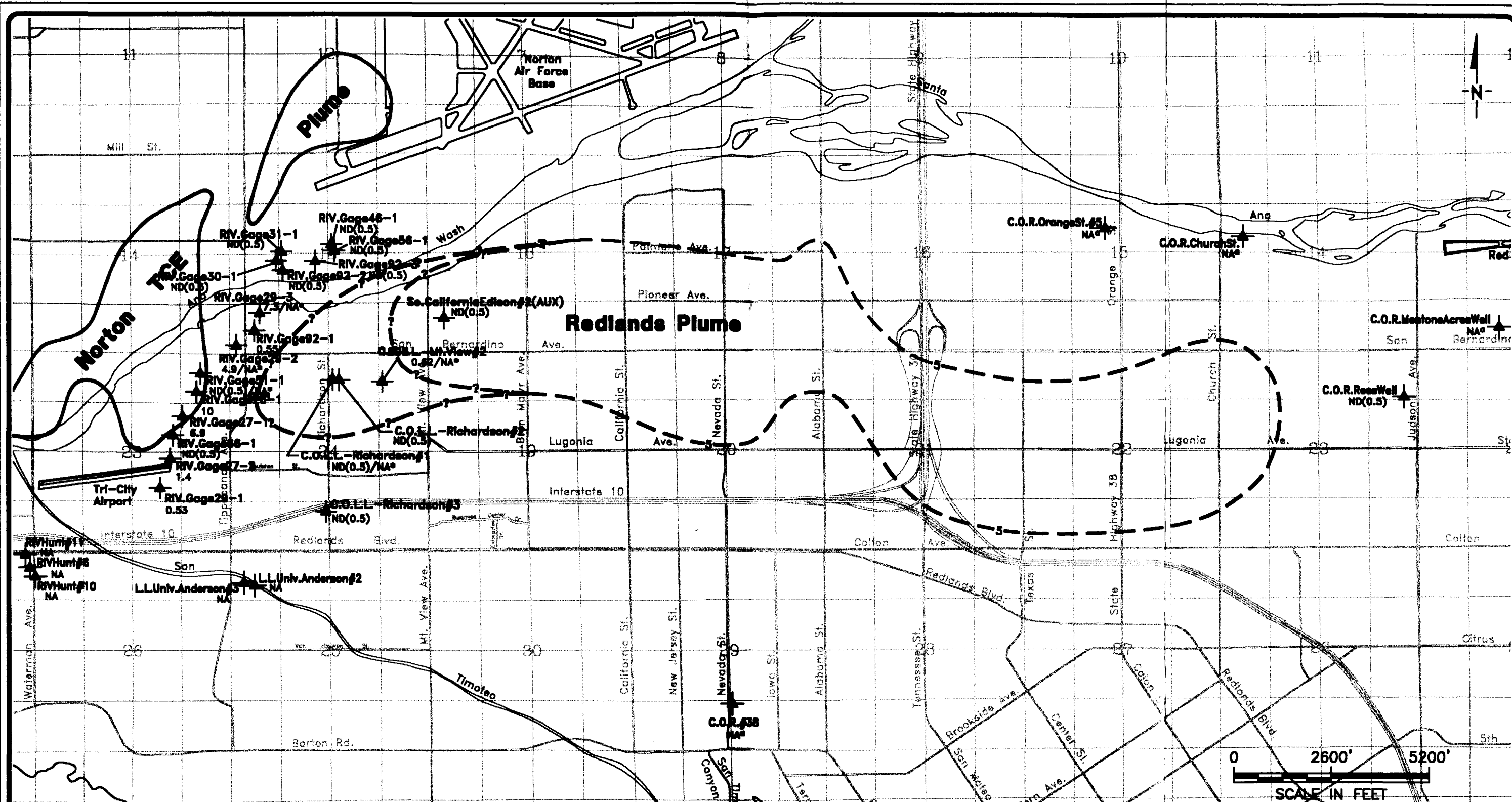
Elevations given in feet above mean sea level (ft-msl)

NM=Not measured

NA=Data not available

Static water levels were allowed to recover a minimum of 30 minutes to obtain a static water level measurement

## FIGURES



# EXPLANATION

Well Currently Sampled Under the Existing WSCP Sampling Program

12 TCE Results ( $\mu\text{g/L}$ )

- Approximate TCE Plume Location  $5\ \mu\text{g/L}$  (1998 interpretation of Redlands Plume)
- Approximate TCE Plume Location  $5\ \mu\text{g/L}$  (1998 interpretation of Norton AFB Plume, by Norton)
- Project  $5\ \mu\text{g/L}$  TCE Contour in Hydrostratigraphic Unit 2
- Project  $5\ \mu\text{g/L}$  TCE Contour in Hydrostratigraphic Unit 4

- ND(0.5) Not Detected at Indicated Detection Limit
- NS Not Sampled
- NA Not Analyzed
- \* Twice-Monthly Sampling Results

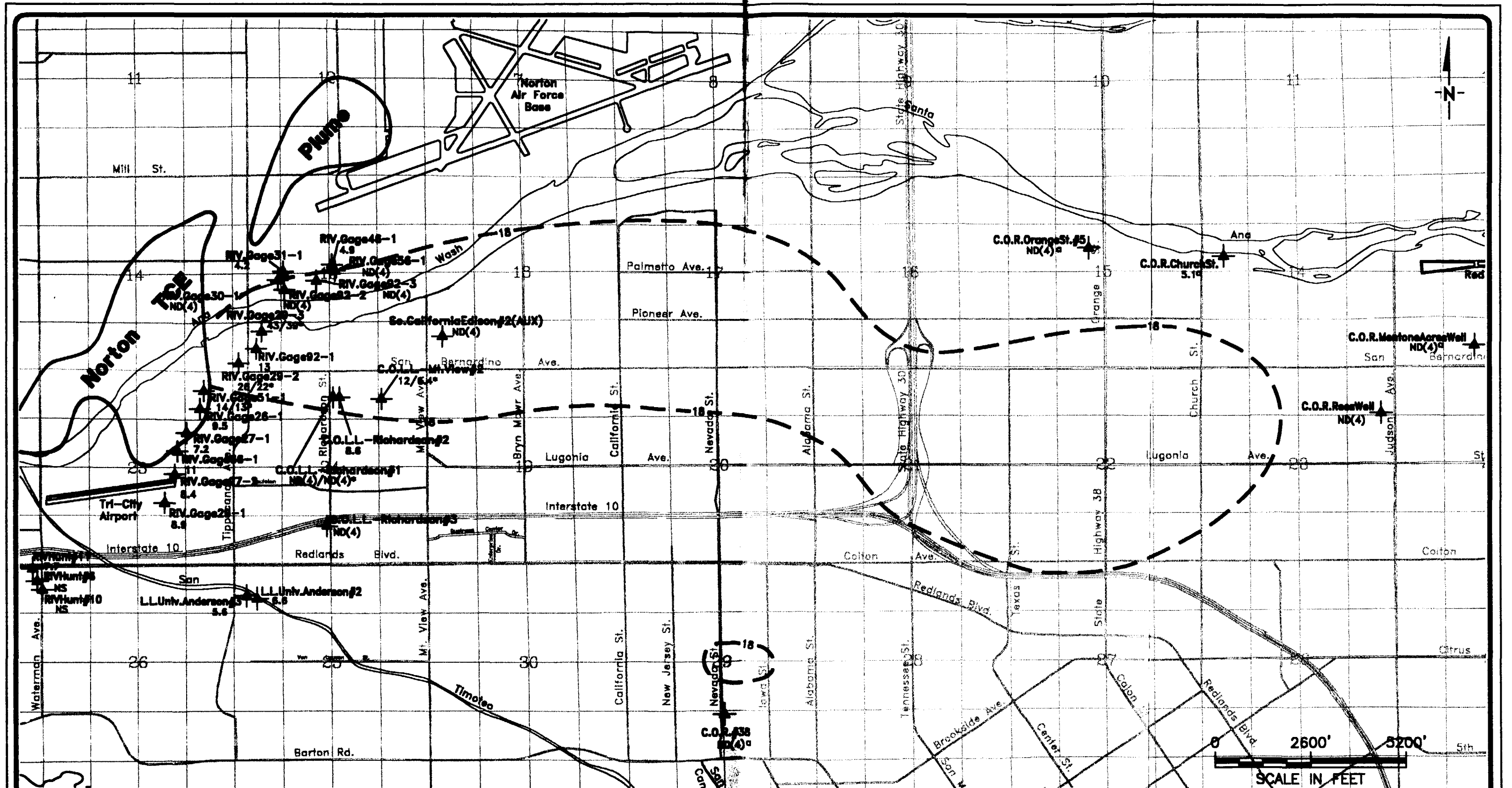
- 0.54/NA C.O.L.L. Mountain View Blend at Lawton
- ND(0.5) C.O.L.L. Richardson Blend
- ND(0.5) Rlv. Iowa Booster (Waterman)
- 0.83 Rlv. Gage Delivery (Gage)
- ND(0.5) Rlv. 7th + Chicago (Reservoir)
- NA Gage Arlington

**TITLE:** WSCP Production Well Sampling Program  
TCE Data Results July 1999

**LOCATION:** LOCKHEED MARTIN  
REDLANDS, CALIFORNIA

**HSI GEOTRANS**  
A TETRA TECH COMPANY

CHECKED:	Tom Titus	FIGURE:
DRAFTED:	Hector Magaña	1
PROJ.:	C541-101	
DATE:	08/05/98	



# EXPLANATION

- ★ Wells Currently Sampled Under the Existing WSCP Sampling Program
- 18- Approximate 18 µg/L Perchlorate Plume Location (1998 Interpretation)
- 5- Approximate TCE Plume Location 5 µg/L (1998 Interpretation of Norton AFB Plume, by Norton)

W:\redlands\pba-graphs\71a723-4.dwg

- 8.2 Perchlorate (µg/L) Results
- ND(4) Not Detected at Indicated Detection Limit
- NS Not Sampled
- Quarterly Sampling Results
- \* Twice-Monthly Sampling Results
- \*\* Confirmation Sampling Results

- 14/8.1\*\* C.O.L.L. Mountain View Blend - Lawton
- ND(4) C.O.L.L. Richardson Blend
- ND(4) Riv. Iowa Booster (Waterman)
- 8.3 Riv. Gage Delivery (Gage)
- 5.7 Riv. 7th + Chicago (Reservoir)
- 8.8 Gage Arlington

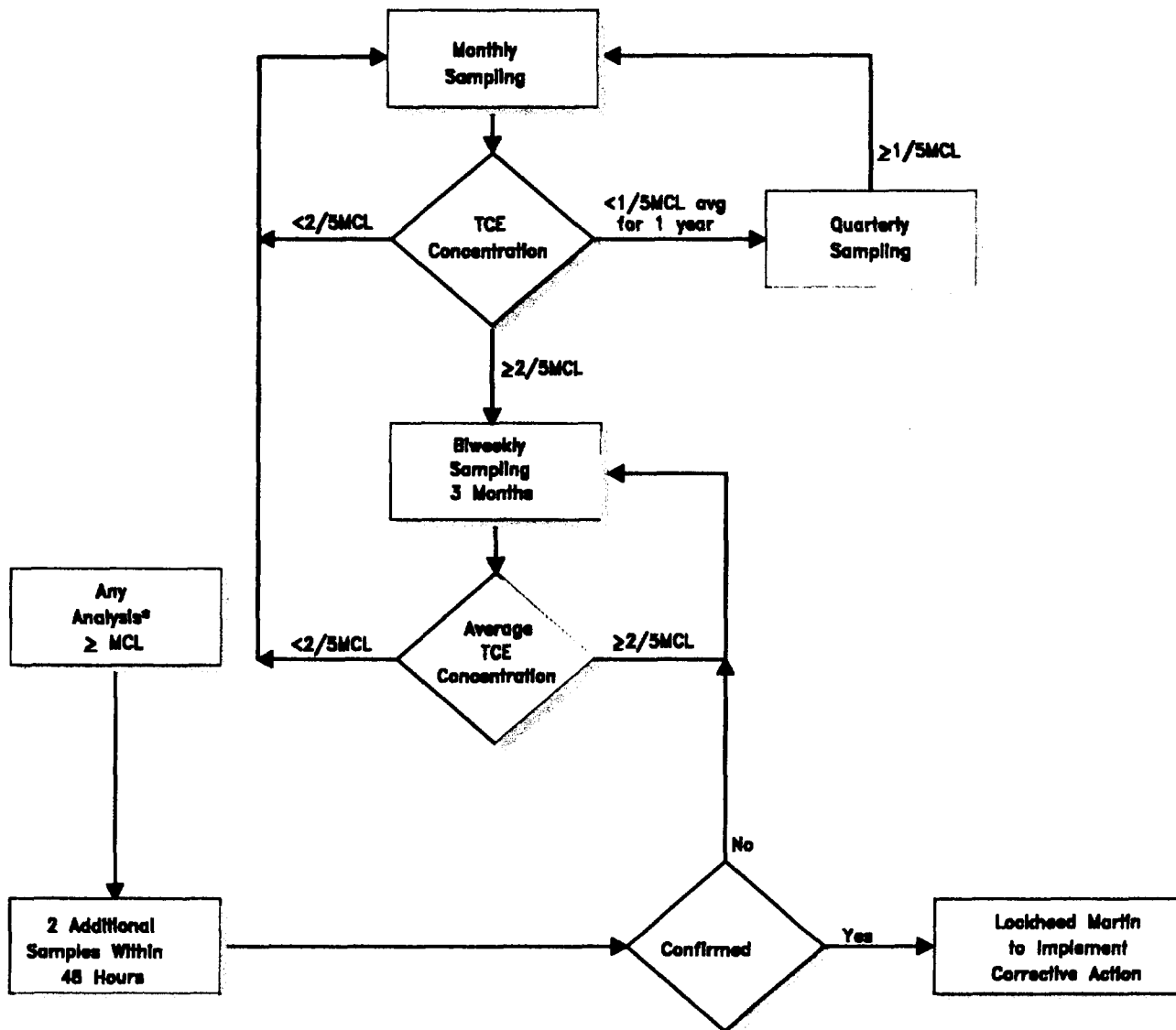
TITLE: WSCP Production Well Sampling Program  
Perchlorate Data Results July 1999

LOCATION: LOCKHEED MARTIN  
REDLANDS, CALIFORNIA

HSI  
GEOTRANS  
A TETRA TECH COMPANY

CHECKED: Tom Titus  
DRAFTED: Hector Magaña  
PROJ.: C541-101  
DATE: 08/05/99


FIGURE:  
2

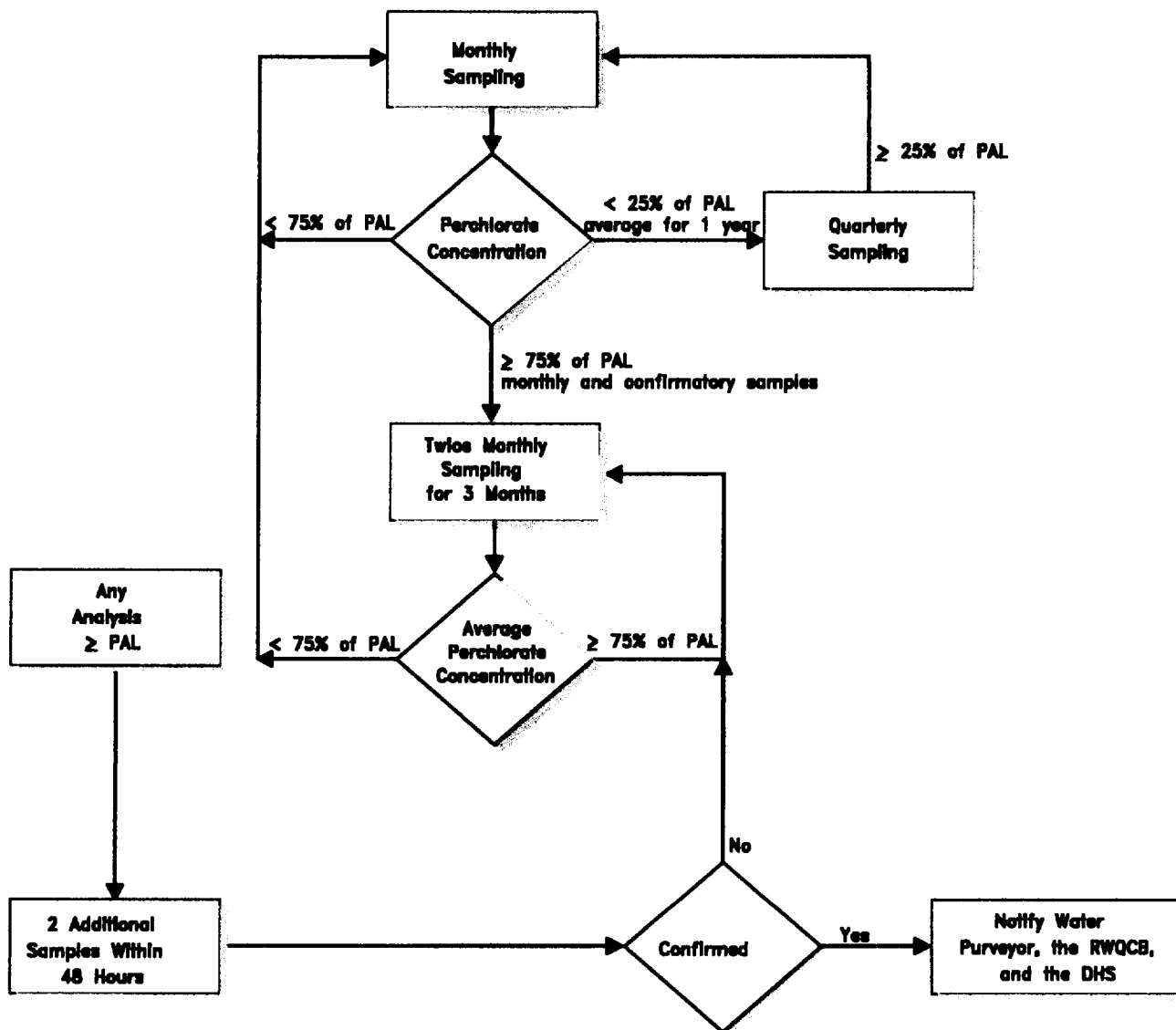


**Footnote:**

\* If, at a specific well, blending is occurring to provide acceptable water for compounds other than TCE, then no corrective action may be necessary as long as the concentration of TCE is less than 5.0 µg/L in the finished water.


TCE MCL = 5 µg/L (California Regulations, Title 22, Division 4, Chapter 15, Section 64444)

TITLE: <b>Decision Matrix for Sampling of Production Wells for TCE from the Crafton-Redlands Plume</b>		
LOCATION: <b>LOCKHEED MARTIN REDLANDS, CALIFORNIA</b>		
 <b>HSI GEOTRANS</b> A TETRA TECH COMPANY	CHECKED: Ron Bruns	FIGURE: <b>3</b>
	DRAFTED: Hector Magaña	
	PROJ.: C541-101	
	DATE: 09/25/98	



**Footnote:**

Perchlorate Provisional Action Level (PAL) = 18 µg/L (California Department of Health Services, May 1997)

TITLE: Decision Matrix for Sampling Production Wells for Perchlorate			
LOCATION: LOCKHEED MARTIN REDLANDS, CALIFORNIA			
 <b>HSI GEOTRANS</b> A TETRA TECH COMPANY	CHECKED:	Ron Bruns	FIGURE:  <b>4</b>
	DRAFTED:	Hector Magaña	
	PROJ.:	C541-101	
	DATE:	09/25/98	



**ATTACHMENT A**  
**GEOLIS FIELD FORMS**

**ATTACHMENT A**

**GEOLIS FIELD FORMS**  
**(Available Upon Request)**

**ATTACHMENT B**

**CHAIN-OF-CUSTODY RECORDS AND  
LABORATORY DATA SHEETS  
QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION**

**ATTACHMENT B**

**CHAIN-OF-CUSTODY RECORDS AND  
LABORATORY DATA SHEETS  
QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION  
(Available Upon Request)**